FIVE YEAR SUMMARY OF EAST REGION WILDLIFE RESEARCH PROGRAM

The Oregon Department of Fish & Wildlife (ODFW) Statewide Research Grant consists of multiple programs that investigate issues related to the management of wildlife resources in Oregon. The East Region Wildlife Research Program conducts management relevant research under three different projects: 1) Elk-Cattle-Deer Interactions Studies, 2) Breeding Bull Elk Studies, and 3) Elk Nutrition-Predation Studies. Historically, these research projects have centered primarily on elk research; however, with ongoing population declines and concern for mule deer our research will shift towards mule deer centered projects in the coming years.

Much of the research conducted by the East Region Wildlife Research Program over the past 25+ years has been conducted in collaboration with the U.S. Forest Service Pacific Northwest Research Station (PNW) as part of The Starkey Project. To date, this collaboration at the Starkey Experimental Forest and Range has been an overwhelming success with over 80 studies on elk and other wildlife completed and over 300 publications produced. Results from these studies have influenced regional and national policy on elk management. Research continues today as part of The Starkey Project and will help contribute to management of native ungulates, their habitat and predators in the future. Additionally, the East Region Wildlife Research Program conducts research on carnivore populations that are not feasible within the boundaries of the Starkey Experimental Forest. Below is a summary of research completed within the last five years and our ongoing research.

Ongoing Research

Cougar

- Monitoring diets, survival, habitat use, and densities of wolves in landscapes that have been recolonized by wolves. This research will identify what effects, if any, wolves have on cougars and the implications this may have for deer and elk populations.

Wolf

- We are currently studying wolf diets and prey selection in multiple prey landscapes in northeast Oregon. This research will help identify the potential effects wolves may have on deer and elk populations.

Elk

- Revision of Blue Mountains elk habitat effectiveness model to better account for forest conditions and nutritional availability. Revised model expected to be completed by end of 2016. Revised model will inform future land management decisions in the Blue Mountains.
- Investigations to determine effects of climate on pregnancy rates and recruitment of elk calves over the past 25+ years at the Starkey Experimental Forest. Results from this analysis will be useful in predicting effects of climate change on elk populations.

Mule Deer

- We are currently engaged in a 10 year research project designed to investigate potential causes of mule deer population declines. Our research will focus on three plausible causes: 1) competition with elk, 2) nutritional limitations on the landscape, and 3) predation by a suite of carnivores.
- Throughout the research project we will monitor pregnancy, fetal, and survival rates of mule deer. Some of the mule deer will be fed during winter to determine if winter nutrition is effecting mule deer populations.
- After the initial 5 years of the study, we will reduce elk populations to see if mule deer pregnancy, fetal rates, or survival rates improve in response to reduced elk densities.
- We will also map nutritional resources available to mule deer throughout the study area to determine if elk are excluding mule deer from high quality habitat. Following a reduction in elk densities, mule deer should utilize high quality habitats.
- We will monitor carnivore densities and diets to determine if they are a primary factor influencing mule deer populations in northeast Oregon.

Completed Research

Elk

- Developed habitat effectiveness models for elk in the Cascade and Coast Ranges of Oregon and Washington. Product will allow land managers to assess effects of land management actions on elk habitat use. Details on this research can be found here: http://www.fs.fed.us/pnw/research/elk/index.shtml
- Developed a population model for elk to determine the effects of predators, nutrition, and climate on elk population dynamics in northeast Oregon. Elk populations were most influenced by human harvest, followed by predation on elk calves by cougars. Reducing cougar densities can help increase elk populations, but most elk populations will be capable of increasing without reducing cougar densities as long as cow elk harvest is minimized.
- Determined the effects of climate, predator densities, and other factors on pregnancy rates and recruitment of elk in northeast Oregon. Pregnancy rates of elk were strongly influenced by late summer nutrition, whereas recruitment was most strongly influenced by cougar densities.
- Investigated the effects of variable archer densities on pregnancy rates and conception dates of elk. We determined that pregnancy rates of females that had calves survive to September were reduced at high archer densities, but females that did not have calves survive were not affected by archer density. Variation in archer density was not responsible for ongoing recruitment declines observed in elk populations in northeast Oregon.

Mule Deer

- Identified herd ranges of mule deer in south-central Oregon based on movements of over 500 mule deer. This process will allow biologists to better estimate mule deer populations and set tag numbers.
- Identified migration routes of mule deer in south-central Oregon. This product will allow managers to identify critical migration habitat for mule deer.
- Identified hotspots for vehicle collisions with mule deer along Highway 97. ODOT will be able to use this information to identify areas suitable for wildlife highway crossings during future development of Highway 97.
- Developed a habitat selection model for mule deer on winter range habitat. This process identified habitat features utilized by mule deer that will be important to conserve during land management activities.

Cougar

- Documented kill rates and prey selection of cougars in northeast Oregon. Cougars selectively preyed on elk calves and mule deer fawns which may be a mechanism by which cougars effect deer and elk populations.
- Estimated survival rates of cougars before and after it was legal to hunt cougars with dogs. This information was used in a population model to determine cougar populations were able to increase under both hunting management systems.
- Conducted simulations to determine the response of cougars to lethal management actions. Results indicated cougar populations robust and resilient to human-caused mortality.
- Developed a new technique to estimate cougar populations using scat detecting dogs and genetic techniques. Results indicated cougar densities in northeast Oregon are some of the highest reported in North America.

SUMMARY OF COMPLETED WORK PRODUCTS

ODFW STAFF ARE NOTED IN BOLD FONT

Presentations and Posters

Clark, D. A., G. A. Davidson, B. K. Johnson, R. G. Anthony. 2012. Cougar prey composition and predation rates in a multiple prey community in northeast Oregon. 19th Annual Conference of The Wildlife Society, Portland, Oregon.

Clark, D. A., B. K. Johnson, D. H. Jackson, M. Henjum, S. L. Findholt, J. J. Akenson, and R. G. Anthony. 2014. Survival rates of cougars in Oregon from 1989-2011: a retrospective analysis. 11th Mountain Lion Workshop, Cedar City, Utah.

Clark, D. A., B. K. Johnson, and R. G. Anthony. 2014. Dynamics of elk populations in eastern Oregon: influence of cougar predation, female harvest, and climate. 48th Annual Meeting of the Oregon Chapter of the Wildlife Society, Bend, Oregon.

Coe, P. K., N. E. Seidel, J. B. Cupples, B. K. Johnson, R. M. Nielson, **S. Gregory**, and **D. H. Jackson**. 2013. Predictors of deer-vehicle collisions in central Oregon. Joint annual meeting Oregon and Washington Chapters, The Wildlife Society, Skamania Lodge, Stevenson, WA.

Coe, P. K. Identifying mule deer migration corridors threatened by highway development. 2015. Oregon Department of Transportation Geo-Environmental Conference, Eugene, Oregon.

Coe, P. K. 2015. Mule deer migration corridors and highways: landscape characteristics associated with deer-vehicle collisions in central Oregon. Western States and Provinces Deer and Elk Workshop 2015, Canmore, British Columbia, Canada.

Coe, P. K. Highway and under burn studies. 2015. East Region Biologist Meeting, La Grande, Oregon.

Cupples, J., S. Gregory, and **D. H. Jackson**. 2012. Mule deer that try to cross the road…and don't get to the other side. Poster presentation at 2012 Annual Meeting of The Wildlife Society, Portland, OR, Oct 14 – 18, 2012.

Cupples, J. B., P. K. Coe, D. H. Jackson, C. Heath, K. Halesworth, and S. Wray. 2014. Use of mule deer highway mortality and migration data to prioritize wildlife passage structures on 2 highways in central Oregon. Poster presentation. The Wildlife Society Oregon Chapter, Bend, OR.

Findlholt, S. L., B. L. Dick, and **B. K. Johnson** 2012. A self-adjusting expandable GPS collar for male elk. Abstract only 19th Annual Meeting of The Wildlife Society, Portland, OR, Oct 14 – 17, 2012.

Gregory, S., J. Cupples, and D. H. Jackson. 2012. Mule deer highway mortality in central Oregon. Poster presentation at 2012 Annual Meeting of The Wildlife Society, Portland, OR, Oct 14 – 18, 2012.

Gregory, S. C. 2015. Mule deer winter resource selection. East Region Biologist Meeting, La Grande, Oregon.

Gregory, S. C. 2015. Mule deer winter resource selection. Western States and Provinces Deer and Elk Workshop 2015, Canmore, British Columbia, Canada.

Hafer, J., **S. Findholt, B. Johnson**, M. Rowland, and M. Wisdom. 2013. Mapping interactions of elk, mule deer, hunters, and ATVS during hunting seasons in northeast Oregon. 10th Biennial Deer and Elk Workshop, May 6 – 9, Missoula, MT.

Johnson, B. K. 2013. Influences of habitat, nutrition, weather, carnivores, and hunters on elk in Oregon. 10th Biennial Deer and Elk Workshop, May 6 – 9, 2013, Missoula, MT.

Naylor, B. J., et al. 2014. Predicting elk nutritional resources and habitat use in western Oregon and Washington. ESRI User Conference, San Diego, CA.

Nielson, R., **S. Findholt**, M. Rowland, M. Wisdom, G. DiDonato, **B. Johnson**, J. Hafer, and B. Naylor. 2015. Deer and elk hunter success at Starkey Experimental Forest and Range. Western States and Provinces Deer and Elk Workshop, Canmore, Alberta, Canada.

Rowland, M., M. Wisdom, J Cook, R. Nielson, R. Cook, **P. Coe**, J. Hafer, B. Naylor, **B. Johnson**, and M. Vavra. 2013. Modeling elk nutrition and habitat use across large landscapes: new methods of meta-analysis. 10th Biennial Deer and Elk Workshop. 6 – 8 May 2013, Missoula Montana. Pages 48-49.

Rowland, M, M. Wisdom, J. Hafer, B. Naylor, M. Vavra, J. Cook, R. Cook, R. Nielson, **P. Coe**, and **B. Johnson**. 2013. Next generation models for elk on Blue Mountains summer range. 10th Biennial Deer and Elk Workshop, May 6 – 9, Missoula, MT.

Rowland, M., **S. Findholt**, M. Wisdom, R. Nielson, **B. Johnson**, J. Hafer, and B. Naylor. 2015. Factors affecting spatial distribution of hunters. Western States and Provinces Deer and Elk Workshop, Canmore, Alberta, Canada.

Technical Reports

Akenson, J. J., **T. L. Wertz, M. G. Henjum**, and **B. K. Johnson**. 2013. Population ecology of black bears in the Starkey Wildlife Management Unit of northeastern Oregon, 1993 – 2000. Oregon Department of Fish and Wildlife, Salem, OR. Wildlife Technical Report 001-2013.

Cupples, J. B. 2014. U.S. Highway 97 Proposed Wildlife Crossing Structure Site Visits: May 14, 2014 and June 11, 2014 – Summary. Unpublished report provided to Oregon Department of Transportation. Oregon Department of Fish and Wildlife, La Grande, Oregon, USA.

Cupples, J. B. and **Jackson, D. H**. 2014. Comparison of mule deer distributions during winter and hunting seasons in south-central Oregon. Wildlife Technical Report 004-2014. Oregon Department of Fish and Wildlife, La Grande, Oregon, USA.

Davidson, G. A., D. A. Clark, B. K. Johnson, L. P. Waits, and J. R. Adams. 2014. A second trial of using conservation detection dogs to estimate cougar populations in northeastern Oregon. Unpublished report on file at La Grande Wildlife Research office.

Clark, D.A. 2015. Assessment of population viability of wolves in Oregon. Oregon Department of Fish and Wildlife, Salem, OR.

Clark, D.A. 2015. A reassessment of population viability of wolves in Oregon. Oregon Department of Fish and Wildlife, Salem, OR.

Thesis and Dissertation

Clark, D. A. 2014. Implications of cougar demography and prey selection on population dynamics of elk in northeast Oregon. PhD Dissertation, Oregon State University, Corvallis, Oregon, USA.

Sage, A. 2014. Estimating density of a black bear population in northeastern Oregon using dogs and genetic mark-recapture techniques. Senior Honors Thesis, Oregon State University, Corvallis, Oregon, USA.

Peer Reviewed Publications

Brodie, J., H. Johnson, M. Mitchell, P. Zager, K. Proffitt, M. Hebblewhite, M. Kauffman, **B. Johnson**, J. Bissonette, C. Bishop, J. Gude, J. Herbert, K. Hersey, M. Hurley, P. M. Lukacs, S. McCorquodale, E. McIntire, J. Nowak, H. Sawyer, D. Smith, and P. J. White. 2013. Relative influence of human harvest, carnivores, and weather on adult female elk survival across western North America. Journal of Applied Ecology 50:295-305.

Clark, D. A., G. A. Davidson, B. K. Johnson, R. G. Anthony. 2014. Cougar kill rates and prey selection in a multiple prey community in northeast Oregon. Journal of Wildlife Management 78:1161-1176.

Clark, D. A., B. K. Johnson, D. H. Jackson, M. Henjum, S. L. Findholt, J. J. Akenson, and R. G. Anthony. 2014. Survival rates of cougars in Oregon from 1989-2011: a retrospective analysis. Journal of Wildlife Management 78:779-790.

Clark, D. A., B.K. Johnson, and **D. H. Jackson**. *In Press*. Monthly and annual survival rates of cougar kittens in Oregon. Northwest Science.

Coe, P. K., R. M. Nielson, **D. H. Jackson**, **J. B. Cupples**, **N. E. Seidel**, **B. K. Johnson**, **S. C. Gregory**, and D. A. Speten. 2015. Identifying migration corridors of mule deer threatened by highway development. Wildlife Society Bulletin 39:256-267.

Cook, R. C., J. G. Cook, D. J. Vales, **B. K. Johnson**, S. M. McCorquodale, L. A. Shipley, R. A. Riggs, L. L. Irwin, S. L. Murphie, B. L. Murphie, K. A. Schoenecker, F. Geyer, P. Briggs Hall, R. D. Spencer, **D. Immell, D. H. Jackson**, B. L. Tiller, P. J. Miller, and L. Schmitz. 2013. Regional and seasonal patterns of nutritional condition and reproduction in elk. Wildlife Monographs 184:1-45.

Davidson, G. A., B. K. Johnson, J. H. Noyes, B. L. Dick, and M. J. Wisdom. 2012. Effect of archer density on elk pregnancy rates and conception dates. Journal of Wildlife Management 76:1676-1685.

Davidson, G. A., D. A. Clark, B. K. Johnson, L. P. Waits, and J. R. Adams. 2014. Estimating cougar densities in northeast Oregon using conservation detection dogs. Journal of Wildlife Management 78:1104-1114.

Dick, B. L., **S. L. Findholt**, and **B. K. Johnson**. 2013. A self-adjusting expandable GPS collar for male elk. Wildlife Society Bulletin 37:887-892.

Johnson, B. K., P. K. Coe, and **R. L. Green**. 2013. Abiotic, bottom-up, and top-down influences on recruitment of Rocky Mountain elk in Oregon: a retrospective analysis. Journal of Wildlife Management 77:102-116.

Kie, J. G., **B. K. Johnson, J. H. Noyes**, C. L. Williams, B. L. Dick, O. E. Rhodes, **R. J. Stussy**, and R. T. Bowyer. 2013. Reproduction in North American elk Cervus elaphus: paternity of calves sired by males of mixed-age classes. Wildlife Biology 19:302-310.